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Hydrodynamical and data-driven modelling of unsteady multiphase flows in pipes

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Multiphase flow occurs in almost all producing wells and production gathering facilities on the surface. Traditionally, such flows are modelled using hydrodynamical approach, which consists in numerical solution of phase conservation equations. As a result, one can estimate a large number of parameters at arbitrary point of the flow. However, there are serious limitations due to complexity of mathematical models which makes the hydrodynamical models difficult to build and to deploy. An alternative approach is to use a machine learning methodology to estimate key parameters of the flow. We demonstrate how a regression neural network can be used as a virtual flow meter for a synthetic severe slugging case.